

Minimizing the Distraction-Related Crash Risk from In-Vehicle Technologies



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National Traffic and Motor Vehicle Safety Act of 1966

General Requirements: “The Secretary of Transportation shall establish by order appropriate Federal motor vehicle safety standards. Each such FMVSS shall be practicable, shall meet the need for ***motor vehicle safety***, and shall be stated in objective terms.”

“**Motor Vehicle Safety** means the performance of motor vehicles or motor vehicle equipment in such a manner that the public is protected against ***unreasonable risk of accidents*** occurring as a result of the design, construction or performance of motor vehicles...”

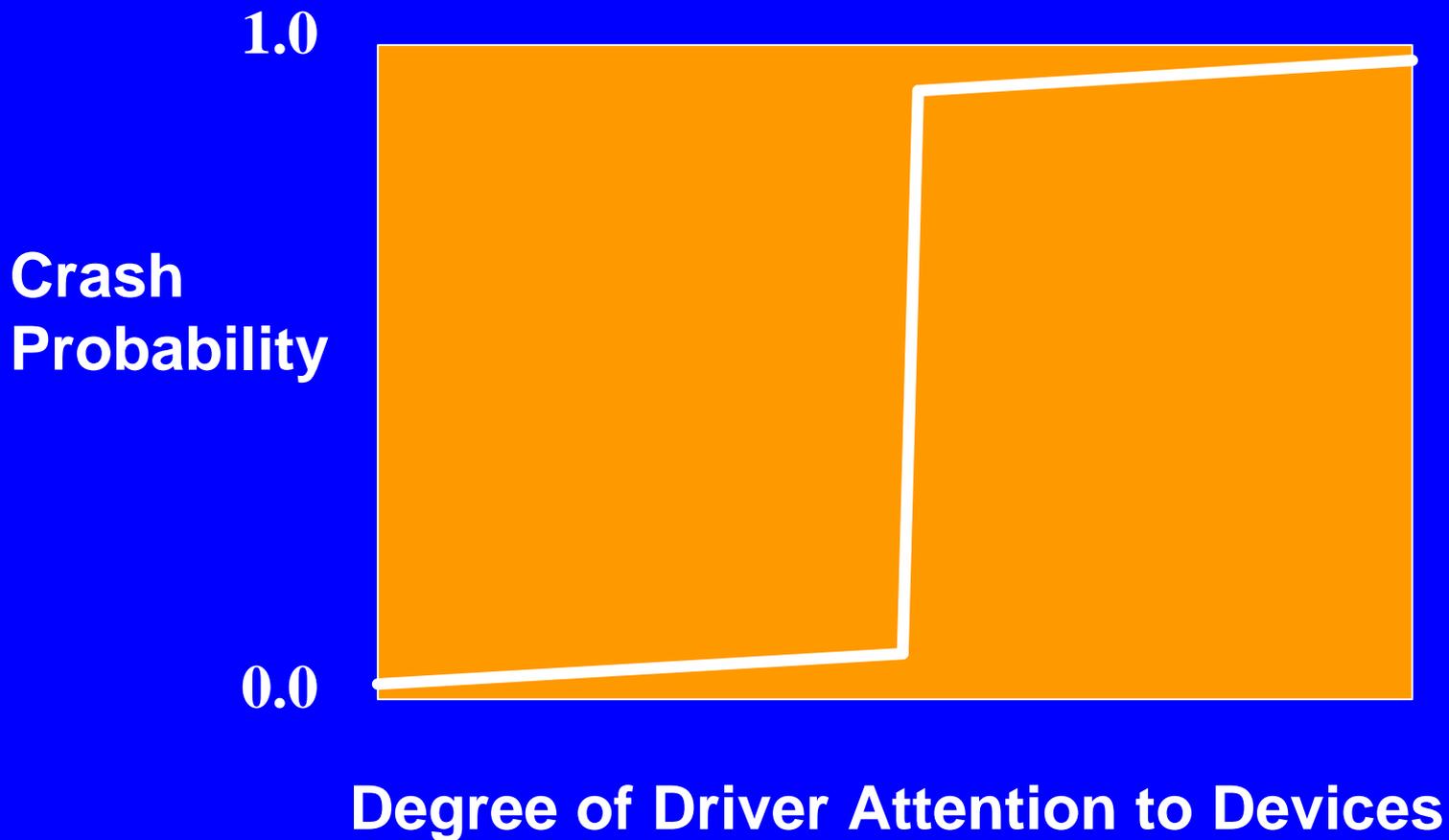
Key Distraction Research Questions

- **What motor vehicle equipment is distracting?**
- **Does distraction increase crash risk?**
- **If 'yes', what distraction risk is unreasonable?**
- **How should a reasonable distraction risk be achieved?**

Potentially Distracting Equipment



Does distraction increase crash risk?



Possible Criteria to Limit Risk:

- Increased crashes due to device use
- Acceptability to public
- Industry best practices
- Benchmarks
 - Performance at legal Alcohol Level
 - Performance tuning Radio

Increased Crashes:

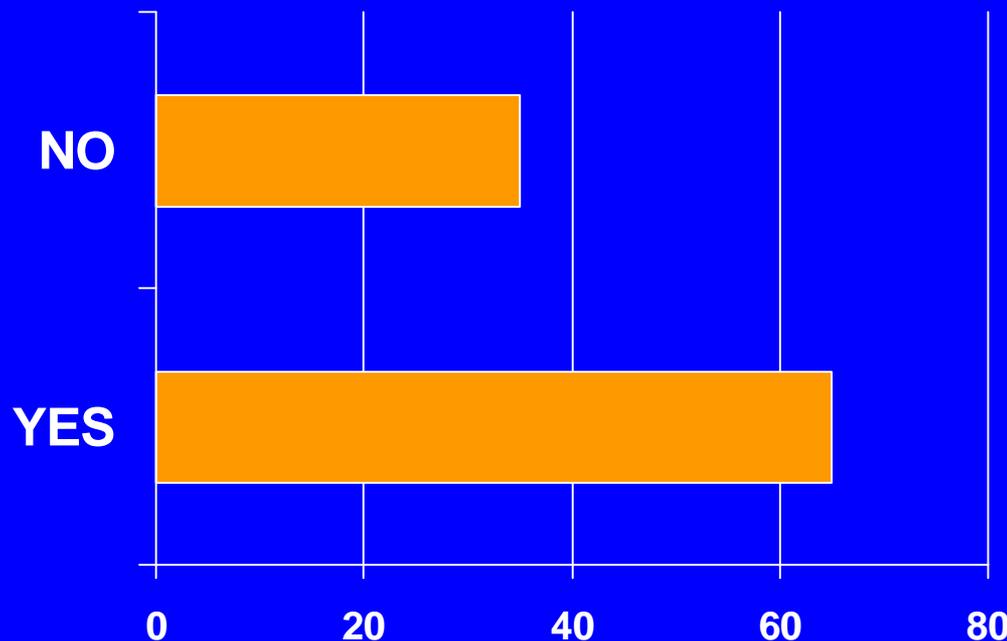
Use of device should not increase crash rate beyond some amount

- **Most direct safety measure, but...**
- **“After the fact” measure**
- **Driver reports can be unreliable**
- **No exposure measure to assess degree of risk**

Public Acceptability:

If drivers will accept lockouts, don't allow operation while driving

Would you purchase a system that prevents you from entering a destination address while the vehicle is in motion?



481 responses from
NHTSA Distraction
Internet Forum, 2000

Public Acceptability

Advantages

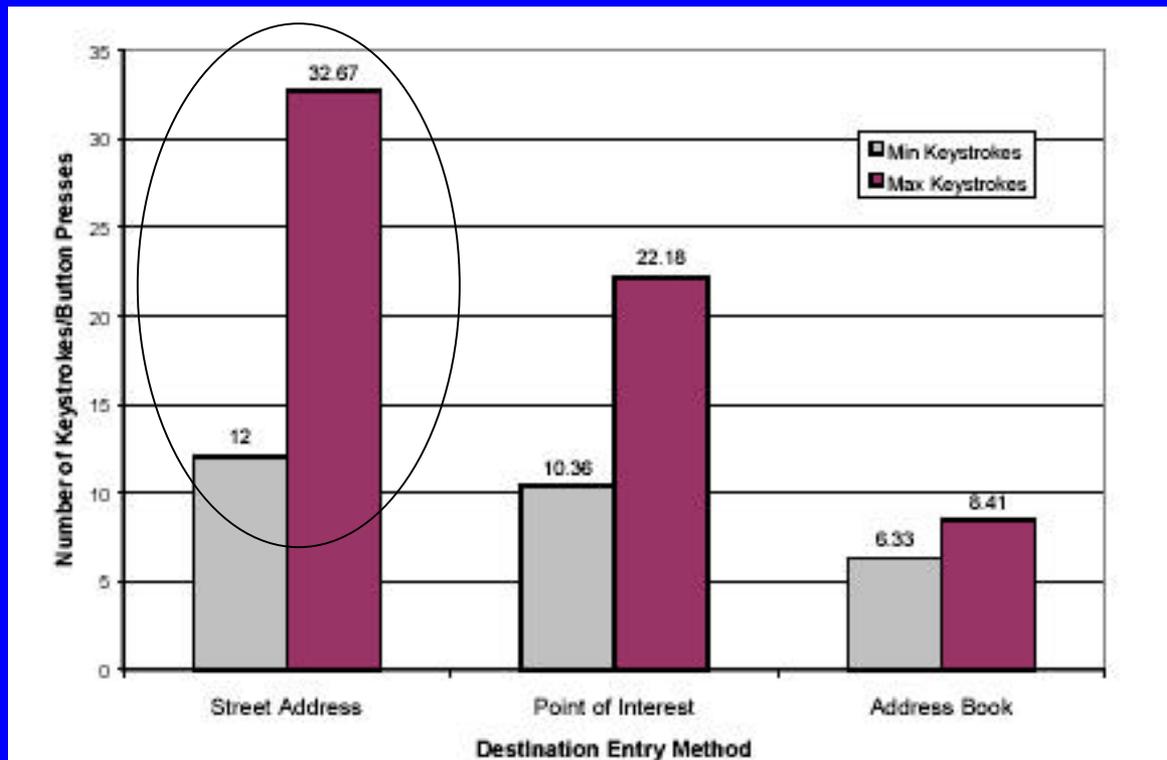
- Gives users what they want
- Democratic
- Could use info to set system default to 85 %ile
- Info obtained easily through interviews

Disadvantages

- Drivers' opinions influenced by using technology
- Difficult to apply in early design stages-need working prototype
- Drivers misperceive risk

Industry Best Practices: Performance using device should be as good as best designs being sold

Minimum and Maximum Number of Key Presses to
Enter a Destination in Navigation System



From NHTSA
Inventory of In-
Vehicle
Technologies,
2002

Best Practices Approach

Advantages

- Conceptually easy to understand
- Similar to setting stopping distances for brake system standard

Disadvantages

- Too design oriented
- Not suited to new devices still in development
- Which design parameters to limit?

Benchmark Approach

- Compare driving performance using distracting device to performance that is at *acceptable* limits
- Example benchmarks are
 - Legal alcohol limit
 - Tuning a radio

Alcohol Benchmark

- **Performance using new technologies should be no worse than performance when at the legal alcohol limit (Burns et al)**
 - **Compared object detection, speed control, reaction times, etc. on simulated driving tasks**
 - **Performance with hand held phone worse than with alcohol, which was worse than normal driving**

Alcohol Benchmark

Advantages

- Accepted limit of dangerous risk
- Can experimentally quantify and compare driving performance

Disadvantages

- Legal limit changes over time
- Impairments from alcohol may not be same as distraction
- Exposure to risk different—time, population, driving conditions

Radio Tuning Benchmark

- **Performance on new devices should be no more demanding than effort to tune radio (Tijerina, Alliance of Auto Mfg)**
 - **Current practice permits tuning radio, which can be distracting and a crash risk**
 - **Driving task performance associated with radio tuning is basis for deciding to lock out new devices while driving**

Radio Tuning Benchmark

Advantages

- Tuning task similar to some new technology tasks
- Metrics can be applied at various stages of product development
- Publicly acceptable risk level

Disadvantages

- Radio tuning has little cognitive component
- Implementation issues: what radio?
- Drivers may trade off secondary task performance for driving performance
- Not applicable to multiple devices

What is NHTSA Doing?

- **Measuring distracted driver performance on test tracks and simulators**
 - Workload Metrics development (CAMP)
 - Existing telematics/infotainment devices
 - Voice interface characteristics
 - Wireless phone use
- **Analysis of naturalistic driving data to compute distraction risk**
 - Determine risk associated with task completion time and eyes-off-road time.
- **Monitor distraction directly to warn drivers or limit information accessibility**
 - Adaptive interfaces, workload managers